PEDERNAL UPLIFT PROVINCE (042)

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INTRODUCTION

The Pedernal Uplift Province covers about 7,700 sq mi in east-central New Mexico and is composed principally of the Tucumcari Basin and its bounding positive features, the Pedernal Uplift, the Bravo Dome, and the Frio Uplift. Major faulting in the province probably occurred in late Precambrian to Early Cambrian time; reactivation of these faults during late Mississippian to early Permian time created the present-day Tucumcari Basin, the most important geologic feature in the province relative to the presence of hydrocarbons. A minor basement high between Bravo Dome and the Frio Uplift separates the Tucumcari Basin from the Palo Duro Basin to the east. Sedimentary rocks ranging from Ordovician (?) to Quaternary in age reach a maximum thickness of about 9,000 ft in the Tucumcari Basin.

No commercial oil or gas production has been established in the province. A single hypothetical conventional play, the Upper Paleozoic and Younger Play (4201), was defined in the province.

ACKNOWLEDGMENTS

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CONVENTIONAL PLAYS

4201. UPPER PALEOZOIC AND YOUNGER PLAY (HYPOTHETICAL)

The definitive characteristics of this hypothetical conventional play are basement block faulting that provides the control for trap configurations within the play and substantial oil shows that confirm existence of a seemly adequate charge of hydrocarbons to sustain the play.

Reservoirs: Adequate reservoirs within the play include marine lime mudstones, about 100 ft thick, in the Mississippian Arroyo-Penasco Group; limestone, sands, and gravel in the Pennsylvanian Magdalena Group measuring in the thousands of feet thickness; limestone, sands, and gravel in the Permian section measuring in the thousands of feet thickness; and sandstone units about 400 ft thick in the Middle Triassic Santa Rosa Sandstone.

Source rocks: Shales in the Pennsylvanian section are likely source rocks.

Exploration status: Basement structure maps are based on a combination of 75 wells penetrating the Precambrian in the Tucumcari Basin, gravity and magnetic data, and some regional reflection-seismic control. These maps show as much as 2,000 ft relief on local basement horsts 10 mi long and 5 mi wide. Many of the better structures appear to have been tested. The major oil shows occur at Santa Rosa and Newkirk. Heavy-oil (tar) sands in the Triassic Dockum Group exposed at and near the surface near Santa Rosa were mined in the 1930's for road-surfacing material. It has been estimated that these tar sands contain over 90 MMBO. Attempts begun in 1981 to lower the viscosity of this heavy oil (5-17¡ gravity API) with steam injection at the Newkirk field, about 20 mi northeast of Santa Rosa, resulted in the production of about 340 BO; the attempts were abandoned in 1984 Although about 200 wells have been drilled in the two counties in the province, no production has been achieved. This number of wells equates to a drilling density of about one well per 40 sq mi.

Resource potential: Although the province is sparsely drilled, the lack of success in establishing production from exploratory wells, most of which were drilled on mapped structures, is not encouraging. The nature of surface-oil shows and attempts at establishing production at Newkirk have shown that lack of adequate seals is a major weakness of this play. The probability of adequate seal integrity was deemed too low to justify individual play assessment.

UNCONVENTIONAL PLAYS

There are no unconventional plays described in this province report. However, unconventional plays listed in the surrounding provinces may include parts of this province. Individual unconventional plays are usually discussed under the province in which the play is principally located.

REFERENCES

Grant, P.R., and Foster, R.W., 1989, Future petroleum provinces in New Mexico: Socorro, New Mexico Bureau of Mines and Mineral Resources, p. 1-94.